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Conservative management of esophageal perforation after a fall

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ABSTRACT

INTRODUCTION: Esophageal perforation in the setting of blunt trauma is rare, and diagnosis can be difficult due to atypical signs and symptoms accompanied by distracting injury.**PRESENTATION OF CASE:** We present a case of esophageal perforation resulting from a fall from height. Unexplained air in the soft tissues planes posterior to the esophagus as well as subcutaneous emphysema in the absence of a pneumothorax on CT aroused clinical suspicions of an injury to the aerodigestive tract. The patient suffered multiple injuries including bilateral first rib fractures, C6 lamina fractures, C4–C6 spinous process fractures, a C7 right transverse process fracture with associated ligamentous injury and cord contusion, multiple comminuted nasal bone fractures, and a right vertebral artery dissection. Esophageal injury was localized using a gastrografin esophagram to the cervical esophagus and was most likely secondary to cervical spine fractures. Because there were no clinical signs of sepsis and the esophagram demonstrated a contained rupture, the patient was thought to be a good candidate for a trial of conservative management consisting of broad spectrum intravenous antibiotics, oral care with chlorhexidine gluconate, NPO, and total parenteral nutrition. No cervical spine fixation or procedure was performed during this trial of conservative management. The patient was received another gastrografin esophagram on hospital day 14 and demonstrated no evidence of contrast extravasation.**DISCUSSION:** Early diagnosis and control of the infectious source are the cornerstones to successful management of esophageal perforation from all etiologies. Traditionally, esophageal perforation relied on a high index of clinical suspicion for early diagnosis, but the use of CT scan for has proved to be highly effective in diagnosing esophageal perforation especially in patients with atypical presentations. While aggressive surgical infection control is paramount in the majority of esophageal perforations, a select subset of patients can be successfully managed non-operatively.**CONCLUSION:** In the setting of blunt trauma, esophageal perforation is rare and is associated with a high morbidity. In select patients who do not show any clinical signs of sepsis, contained perforations can heal with non-operative management consisting of broad spectrum antibiotics, strict oral hygiene, NPO, and total parenteral nutrition.© 2013 Surgical Associates Ltd. Published by Elsevier Ltd. Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

1. Introduction

Esophageal perforation due to blunt trauma is an exceedingly rare entity, with the most comprehensive reviews accounting for less than 100 reported cases.^{1,2} Esophageal perforation by any etiology is considered life-threatening, and carries a mortality rate estimated from 18% to 48%.^{7–9} Classic discussion of spontaneous esophageal perforation detailed an increase in intraluminal pressure with failure of the upper esophageal sphincter to relax. This would yield a perforation in the left or sometimes right distal posterior esophagus. However, esophageal perforations due to blunt

mechanism are secondary to associated cervical fractures and hyperextension of the neck causing traction and perforation. Current surgical management focuses on early diagnosis and aggressive treatment including surgical drainage, attempts at primary repair, and abscess drainage when indicated. When appropriate, open repair remains the standard of care, although endoscopic stenting and other minimally invasive techniques are beginning to gain more widespread use, most notably in patients who are poor surgical candidates and not floridly septic.^{17,18} For a select group of patients, contained esophageal perforations are best managed non-operatively.^{8–10} Achieving a better understanding of both these patients and their specific esophageal injuries will allow us to better comprehend which injury types are amenable to conservative management and avoid the added morbidity of an operative procedure without increasing the overall mortality of the injury.

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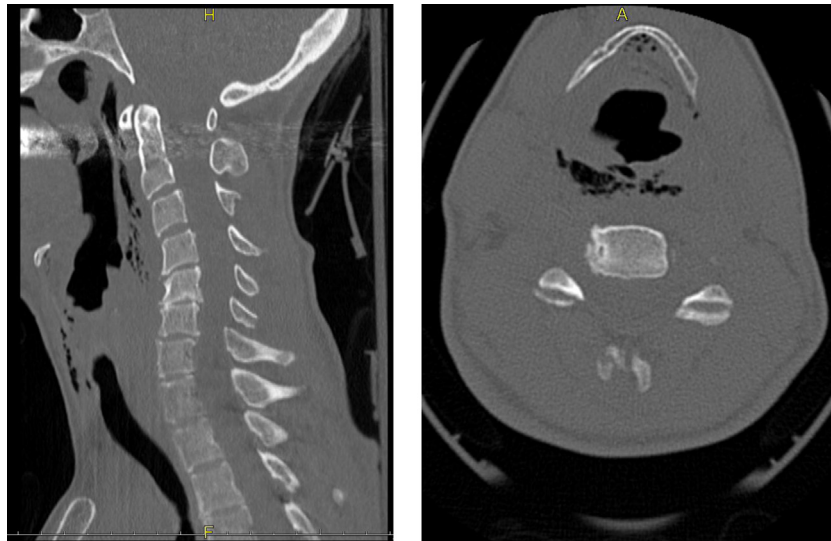


Fig. 1. CT of the cervical spine showing subcutaneous emphysema adjacent to the esophagus and extending into cervical soft tissues.

2. Presentation of case

A 51 year old female fell from a height of 10 feet, hitting the ground face first. She was resuscitated with the ATLS protocol. Her airway was intact, and breathing was spontaneous and unlabored. Palpation of her groin revealed her to be bradycardic with 2+ pulses, and she was found to have no sensation or motor function below the nipple line. Her hand grip was also found to be weak 3/5, and her GCS 15. Initial vitals showed her to be normothermic at 97.5 F, normotensive at 96/65, bradycardic with a heart rate of 44, and breathing comfortably 13 times per minute with a saturation of 97% on 3 L nasal cannula. Her trauma bay chest X-ray showed possible bilateral 1st rib fractures with no evidence of pneumothorax. A pelvic X-ray was not taken in the trauma bay. EKG showed sinus bradycardia without evidence of PVCs, PACs, or other ectopy. During the secondary survey, palpation of her cervical spine was significant for midline tenderness and a palpable step-off at C4–C5. Palpation of the thoracic spine found tenderness at T4. Rectal tone was absent on exam. The remainder of her primary and secondary survey revealed no other gross deformity or obvious injury.

CT of the cervical spine, and chest showed extensive bony injuries including a C6 lamina fracture, C4–C6 spinous process fractures, and a C7 right transverse process fracture, as well as bilateral first rib fractures. Furthermore, the CT revealed subcutaneous emphysema adjacent to the esophagus extending into the cervical soft tissues (Fig. 1). CT of the facial bones showed comminuted nasal bone fractures and a nasal septal fracture with right-sided deviation. CTA of the neck revealed opacification of the right vertebral artery from its origin throughout its course in the transverse foramen with reconstitution at the foramen magnum consistent with traumatic vertebral artery dissection. Esophagram showed a contained esophageal perforation at the C3–C4 level (Fig. 2). MRI ruled out spinal cord transection, but showed spinal cord contusion, hematoma, and prevertebral swelling with an associated ligamentous tear involving the interspinous and spinal laminar ligament of the posterior column between C4 and C7.

The patient was admitted to the ICU with neurogenic and spinal shock, eventually requiring tracheostomy for respiratory failure on hospital day 6. The contained esophageal perforation was managed non-operatively taking nothing per mouth, broad-spectrum empiric antibiotics, and total parenteral nutrition. Oral hygiene to reduce bacterial load was maintained with a chlorhexidine gluconate rinse twice daily. Nasogastric tube was not utilized to prevent any

potential esophageal trauma during NG tube placement. During her ICU course, she remained afebrile and her white blood cell count remained within normal limits.

On hospital day 14, a gastrograffin esophagram was repeated and showed no evidence of perforation (Fig. 3). A follow-up CTA of the neck showed no abnormal fluid collections or abscesses, and complete resolution of the retropharyngeal and mediastinal air (Fig. 4). The patient was started on a liquid diet and slowly advanced. She was discharged to a rehab facility shortly thereafter. Neurosurgery planned to keep her in a Miami J collar for 6 weeks and reassess her need for cervical spine fixation at that time. At her 2 week follow-up, her upper arm strength was improving, and she was able to feed herself. At 2 months, lower extremity motor recovery was slow, but she was regaining some ability to move her toes. She reported no issues with swallowing.



Fig. 2. Esophagram showing a focal contained esophageal leak consistent with perforation.



Fig. 3. Post trauma day 14 CTA of the neck showing resolution of subcutaneous emphysema surrounding the esophagus without evidence of abscess or fluid collection.

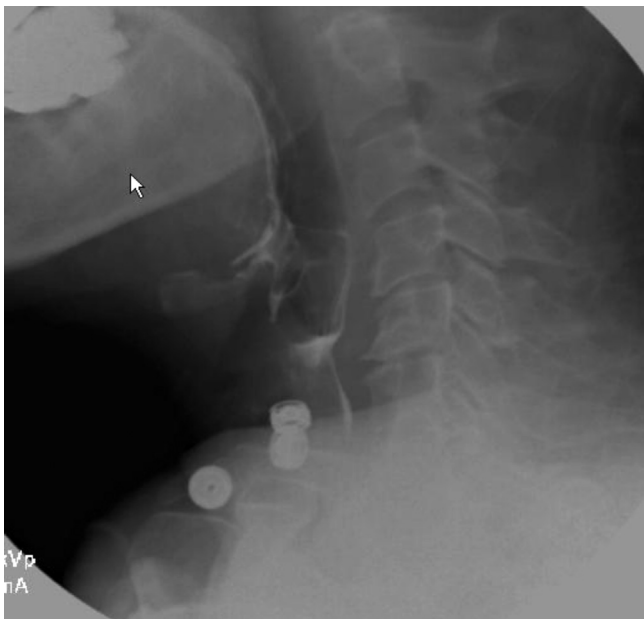


Fig. 4. Post trauma day 14 esophagram showing resolution of the perforation.

3. Discussion

Esophageal perforation is life threatening, and in many cases considered a surgical emergency with high associated morbidity and mortality rates.^{2–4,6,8–10} Esophageal perforation can be attributed to a broad spectrum of etiologies, from spontaneous rupture (Boerhaave's), to iatrogenic injury, to blunt and penetrating trauma.⁸ Early diagnosis of the perforation and control of the infectious source are the principles of management. Primary repair or diversion are decisions traditionally based on how quickly the injury is recognized. Injuries diagnosed within 16 h are evaluated for primary repair and coverage with a vascular pedicle.

The clinical features most common to all types of esophageal perforation are pain (most common), fever, dyspnea, and crepitus.^{7–9} Traditionally, the mediastinal emphysema was described as a “crunch” heard on auscultation known as Hammon's sign. Likewise, Mackler's triad which includes chest pain, vomiting, and subcutaneous emphysema suggest esophageal perforation but is only found in a minority of patients. While clinical signs and symptoms may be highly suggestive of the diagnosis, trauma patients often have distracting injuries or may have atypical presentations which make the clinical diagnosis unreliable.

Chest X-ray can be highly suggestive of esophageal perforation in up to 90% of patients revealing pleural effusions, pneumomediastinum, and hydrothorax, but may miss early or small perforations.^{8,9} While contrast esophagram is the gold standard for diagnosis and localization of esophageal perforation,^{1,4,8–10} several adjunctive diagnostic studies can be utilized to identify perforation. In patients where findings on esophagram are equivocal, upper endoscopy has been employed to not only identify the injury, but also to evaluate the surrounding pathology.¹⁹ Instrumentation of the esophagus not only carries a risk of worsening the injury, but could potentially cause further contamination of the perforation site.²⁰ CT scan of the neck is proving to be a valuable diagnostic study in patients who are critically ill or have atypical clinical presentations.⁹ CT of the neck has been reported to detect up to 92% of esophageal perforation, and in certain cases, CT was the first finding to suggest the diagnosis.¹³ CT findings most commonly found with perforation include extraluminal air, mediastinal air or fluid, pleural effusions, and esophageal thickening.^{8,13–15} The use of CT may expedite the diagnosis of esophageal perforation in the critically ill or in patients with non-specific or atypical symptoms.

Once diagnosed, management of esophageal perforation focuses on controlling the source of contamination, providing adequate drainage if needed, augmenting host defenses, and maintaining nutrition.^{8,9} In patients with free rupture, surgical therapy may involve primary closure, surgical drainage, exclusion and diversion, and esophagectomy.^{8–10} A contained perforation can be managed non-operatively if strict criteria are met as first described by Cameron and later extended by Altorjay. These criteria include drainage of the cavity back into the esophagus, minimal signs of clinical sepsis, non-neoplastic etiology, cervical or thoracic location.^{4,8,9,12} Even meeting these criteria, up to 20% of patients managed non-operatively will require surgical intervention.^{8,9} In our patient, these criteria were met, making her a good candidate for non-operative management which included NPO, TPN, broad-spectrum antibiotics, and strict oral hygiene.^{8–10,12} If at any point during her non-operative course our patient had developed any signs of sepsis, emergent operative management would have been undertaken.

4. Conclusion

Esophageal perforation due to any cause is associated with a high morbidity and mortality. In the setting of blunt trauma, perforation is extremely rare, but failure or delay of the diagnosis can have devastating consequences. For patients who have contained ruptures and are show no clinical signs of sepsis, a trial of conservative management may be successful in healing the esophagus. The conservative management consists of broad spectrum antibiotics, oral hygiene with chlorhexadine gluconate, NPO, and total parental nutrition or enteral nutrition through a jejunostomy tube. Cervical spinal stabilization procedures are delayed until repeat esophagram reveals that the esophagus has healed.

Conflict of interest statement

None

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Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contributions

Delos Reyes – writing, clinical management; Clancy – clinical management; Lach – clinical management; Olorunto – clinical management; Williams – study design, clinical management.

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